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THE JUNIOR ACADEMY—PAST, PRESENT, AND FUTURE¹

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The constitution of the Ohio Academy of Science directs the establishment and perpetuation of a Junior Academy for the purpose of discovering and fostering ability in science among high school students. In the past, the Academy made several attempts to promote science in the high school curriculum through cooperation with science teachers, but did not receive much encouragement for their efforts until the 1930's. Dexter (1961) traced the beginning of organized programs involving the Academy and high school science students to the interest and enthusiasm of Dr. C. G. Shatzer, who in 1929 as a committee of one introduced plans and laid the groundwork for a District Science Conference to be held in 1932. The conference, involving 94 student-project displays, was conducted by students, with professional guidance from Dr. Shatzer. It was not until 1940 that the Junior Academy, under the sponsorship of Dr. Charles W. Jarvis, was made a Section of the Senior Academy.

World War II interrupted the activity of the Junior Academy, but it was reactivated and reorganized by Dr. Frederick H. Kreckler in 1948 and placed under the administrative supervision of the newly formed Science Education Section. Dr. Kreckler became the first Executive Secretary and directed the first State Science Day Program at Denison University on April 22, 1949. The Science Day Program, supplemented by student scholarship tests, awards for outstanding teachers, school awards for excellence of science programs, and the *Ohio Academy of Science News*, became the major activity of this modernized Junior Academy.

The present-day version of the Junior Academy has evolved, through a series of changes in and additions to the original program, into an organization with national prominence among junior academies. The Science Day Programs at state and district level, except for changes in administrative organization, have remained essentially the same as originally envisioned by Dr. Kreckler. Wide-ranging changes have altered the scope and status of the Scholarship Program and the School Awards Program. The *Ohio Academy of Science News* has evolved from a small mimeographed pamphlet into an eight-page newspaper. Several significant new programs have been added to the Junior Academy including the following. (1) Science exhibits at the Ohio State Fair were started in 1953. (2) A program for affiliation of Local Science Days was initiated in 1958. (3) State Science Day Awards were first presented in 1959. (4) The Junior Academy Sessions were held for the first time in 1961. (5) The Junior Science and Humanities Symposium was added in 1963. The Junior Academy Council was instrumental in establishing the Junior Academy Section (Section N) of the Senior Academy in 1972.

STATE FAIR EXHIBITS

John Wargo succeeded in persuading exhibitors at the 1953 Ohio State Fair to provide sufficient space for display of three science projects. Very little interest

¹Presidential address delivered at the Eighty-second Annual Meeting of The Ohio Academy of Science at John Carroll University, Cleveland, Ohio, on April 27, 1973.

was expressed by the State Fair Board, and this type of hand-to-mouth space-sharing existence continued until 1962, when Michael Desmond of Archbold, a member of the State Fair Board and former Cleveland newspaperman, promoted Youth Science Exhibits as the breakaway program to change the State Fair to a cosmopolitan event rather than an exclusively agricultural exhibition. The exhibits were accorded full department status in the Junior Fair Division, with a Superintendent, a budget, representation on the Junior Fair Board, and a system of awards. The first exhibit featured astronaut John Glenn and resulted in the first and only Ohio Academy of Science movie, "John Glenn Speaks to Young America." The program is still supervised by the original committee and is limited to 120 projects divided into three groups of forty each. The exhibits are noncompetitive, with each project being awarded a trophy.

AFFILIATED LOCAL SCIENCE DAYS

The Affiliated Science Day Program is an attempt by the Junior Academy Council to reduce the number of projects at District Science Days. One district received more than 1,200 entries, resulting in a multitude of problems for the District Council and considerable aggravation for the college center.

District Councils may require schools to select entries for the District Science Day from top-rated projects at a local event. The Affiliated Science Day Program is designed to aid the administration of these local science days by providing standardization of forms, procedures, and judging criteria, reduction in cost of supplies, and advice on operational and administrative matters. The Junior Academy does not charge for affiliation. Three districts, North Central, Mohican, and West, require affiliation as a condition for participation at their District Science Days.

STATE SCIENCE DAY PROGRAM

The principal activity of the Junior Academy since its reorganization in 1948 has been the State Science Day Program. Science Days are occasions for display and evaluation of projects presented by high school students. The Science Day Program has provided a common interest needed for cooperation among professional scientists, teachers, and high school students for the past quarter of a century.

Administration of the Science Day Program is accomplished through district centers located on college campuses throughout the state. Each district center sponsors a District Science Day. State Science Day, the culmination of the program, is held in April and involves top-ranked projects from the District Science Days. The entire program is supervised by the Junior Academy Council, composed of committee chairmen, district representatives, and designated academy members.

Initially, Dr. Kreckler divided the state into five districts with centers at Bowling Green State University, Kent State University, Miami University, Ohio University, and The Ohio State University, but as the popularity of the program increased it soon became apparent that more districts would be needed in order to provide necessary display facilities and to maintain quality in the judging process. Additional district centers were authorized at Muskingum College (1951), Wittenberg University (1955), Heidelberg College (1958), The Defiance College (1960), Ashland College (1961), Denison University (1967), and Ohio Northern University (1971). Central State University replaced Wittenberg University in 1961, and Marietta College replaced Muskingum College in 1969 as district centers.

The first State Science Day was held at Denison University in 1949 and attracted 78 projects. State Science Day soon developed from a minor event at the Annual Meeting of The Ohio Academy of Science into a giant that overtaxed the facilities of the host institution. Overwhelmed by a record number of 877 student participants in the 1958 State Science Day at the University of Akron,

the Council of the Junior Academy began limiting the number of projects permitted at State Science Day. In 1964, this activity was removed from the agenda of the Annual Meeting and State Science Day was moved to the Ohio State Fairgrounds in Columbus as an independent project.

The imposition of limits caused State Science Day participation to stabilize at near the 600-project level subsequent to 1959, but District Science Days continued to bear the burden of the "post-Sputnik era." District participation reached a peak of nearly 6,400 projects in 1967, after which a gradual decline produced the present level of 4,000 projects. Apparently the Science Day Activities are very popular with high school science teachers and their students (fig. 1).

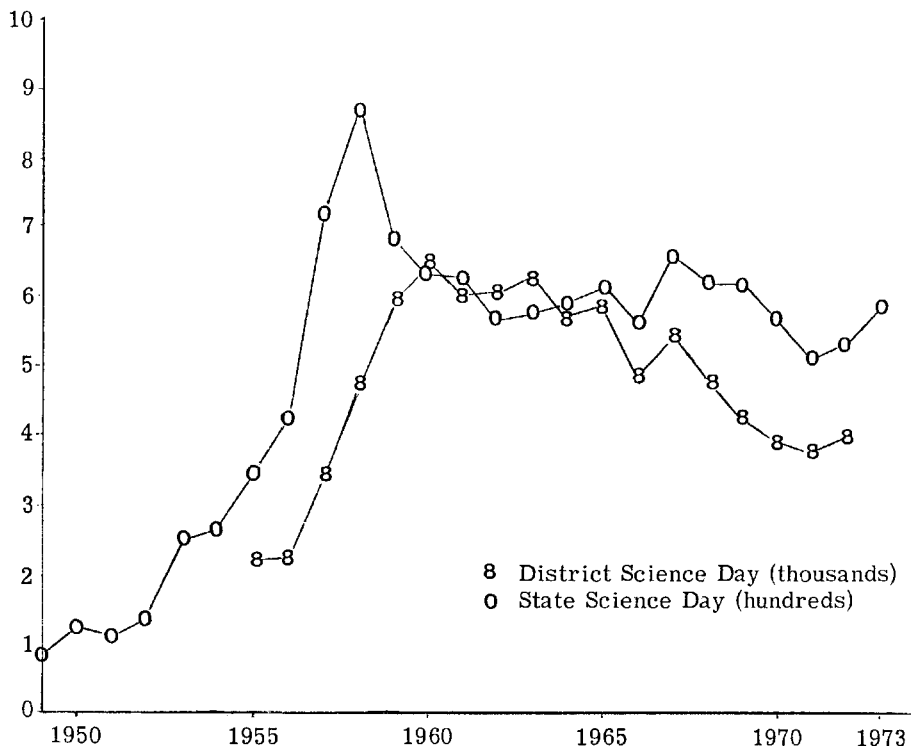


FIGURE 1. Number of projects presented at Science Days sponsored by Junior Academy.

JUNIOR ACADEMY SESSIONS

The Junior Academy Sessions were held for the first time in 1961 at the University of Cincinnati, at which time three high school students presented research papers. Since that time, many more students have presented papers. The sessions, one in the morning for papers related to the biological sciences and another in the afternoon for papers related to the physical sciences, are held in conjunction with the annual meeting of the Academy. Each district selects two papers—one for presentation at each session. The program is noncompetitive, and certificates are awarded to all the participants. This program was supported by the National Science Foundation from 1961 to 1970, during which time participants were reimbursed for a portion of their travel expenses. The program has continued since termination of National Science Foundation support without reimbursement to participants. Mr. Karl Braun supervises the program.

OHIO JUNIOR SCIENCE AND HUMANITIES SYMPOSIUM

The Ohio Junior Science and Humanities Symposium is part of a national program sponsored by the United States Army Research Office through a grant to Duke University. The grant provides complete financial support for the national program and partial support for 30 regional symposia. (Present support level for the Ohio Symposium is \$5,000 a year.)

The Ohio symposium was held for the first time in 1964 under the title of "Science Youth Congress," with financial support in the amount of \$5,000 from the United States Department of Health, Education, and Welfare. The 1965 Symposium received \$2,500 from the Science Youth Congress and another \$2,500 from the Army Research Office. Subsequent to 1965 the present level of financial support has been received from the national program.

The Ohio Junior Science and Humanities Symposium is a three-day program held at the Rhodes Center in Columbus in February each year. It is a multi-faceted program centered around student presentations of research papers and including tours of Columbus area research facilities, career-information sessions at the Center of Science and Industry, and presentations by noted scientists and humanists. Six students selected from those presenting papers represent Ohio at the National Symposium as delegates, and one of the six students presents his paper at the National Symposium in competition for a trip to the British Science Fortnight held in London, England, during July. Five trips are awarded each year.

Delegates to the Ohio Symposium are sponsored by local service clubs, school organizations, and other groups interested in the school programs. The sponsoring group pays an application fee covering housing and food. Delegates must be high school sophomores or juniors with an academic average of *B* or better and an interest in science.

SCIENCE PROJECTS

Science-project activities provided the spark for the reactivation of the Junior Academy, promoted the development and growth of the Junior Academy into an organization of national reputation, and enabled the Junior Academy to maintain a high level of prominence in the face of declining popularity of the sciences. Therefore, it was highly desirable, if not mandatory, at the beginning of the twenty-sixth year of the Junior Academy, to reexamine the faults and benefits of the science-project activity which provided the foundation upon which the Junior Academy functioned. Further evaluation of the program was made in order to justify its existence and to recommend such changes as may be necessary to modernize the operation and to plan for future requirements.

Science-project-type activities have been severely criticized in the past by scientists, teachers, participants, and just plain laymen. It appeared at one time or another that almost everyone had an ax to grind about precollege science programs of this type. Dr. Walter G. Rosen (1963), in a letter to the editor of the *American Institute of Biological Science Bulletin*, listed eight indictments of the science fair. He summarized them by stating, "I feel that science fairs do a disservice to science education, to science recruitment and to the spirit of scientific inquiry." This letter was published in the February 1963 issue of the *Bulletin* and reverberations both pro and con are found in subsequent issues. Dr. David Hammond (1963) started another rhubarb by his article, "Science Fairs and Cooperation," published in the August 1963 issue of *Turtlox News*. The controversies just listed include the usual indictments: gaudy display, inappropriate topics, outside contributions, required participation, pressure to produce, improper evaluation, gadgetry, and sophisticated equipment.

A review of a considerable number of letters received, both in praise and in condemnation of the Junior Academy Program, reveals the same and other criti-

cisms, for example, such as space restrictions, parental pressure, teacher revenge, incompetent judges, improper grouping of projects. Every one of these criticisms involves the administration of the program and not the program itself. Certainly, unqualified judges may give poor evaluations. If school administrators pressure teachers, teachers will put pressure on students, resulting in many poor projects at the local level. If judges permit gadgetry, equipment, and colorful display to cloud their vision, an injustice will be done.

It is not necessary to rebut all criticisms listed, and it would be inappropriate to deny the validity of any of them, but virtues of a well-managed program will overwhelmingly outweigh the defects. A survey was undertaken to determine how many of the seniors who entered projects at State Science Day continued their education. Participants in State Science Days held in 1966, 1968, and 1970 were selected for the survey. Those graduating from high school in 1966 have completed college and are in graduate school or are settled in the job market. Those graduating in 1968 completed college last year, and those finishing high school in 1970 are still in college. Response to the questionnaires was gratifying.

TABLE 1
Status of State Science Day participants one year after graduation

	Year of graduation		
	1966	1968	1970
% of questionnaires returned	53	58	90
No. of students reported	99	84	73
No. attending college	77	69	65
% attending college	77	82	89
No. attending college in Ohio	55	45	48
No. at district center	38	32	25
No. attending technical school	2	0	2
No. attending nursing school	3	3	5
No. in military service	0	2	0
No. deceased	1	0	0
No. not in school	2	3	0
Information not available	14	7	1
% of high school students attending college	47.4	44.5	(32.3*)

*Not used in computing totals.

Replies were received from 53% of the 1966 questionnaires, 58% of the 1968 questionnaires, and 90% of those for 1970.

Information provided by responses to the questionnaires is given here in two tables. Table 1 indicates the status, one year after graduation from high school, of students who participated at State Science Day during their senior year. Table 2 presents the present status of all students responding.

Answers received from schools canvassed were 53% for 1966 graduates, for 1968 graduates 58%, and 90% for 1970 graduates. Schools replied that 47.4% of their 1966 graduating classes entered college. The comparable figure for 1968 was 44.5%. Only two schools answered this question for the 1970 graduating class, so this year was not considered in computing the totals. The schools answering this portion of the questionnaire seemed to be a representative group, with percentages of the graduating class entering college ranging from a high of 98% to a low of 10%. The 1966 figure of 47.4% is considered the average portion of high school graduates entering college.

Thus, for each of the three years covered by this survey, the students who participated in State Science Day during their senior year (1966, 1968, 1970)

matriculated in college the following year at a much higher percentage than the average for the schools from which they graduated. The survey indicates that these students prefer to stay in Ohio; in addition, the majority of those staying in Ohio entered a college serving as a Junior Academy District Center.

Table 2 indicates that 15.8% of the 1966 and 1968 high school graduates included in the survey are now pursuing an advanced academic degree program (MS, MA, PhD, etc.) and 5% an advanced professional degree program (MD, DVM). Eight percent are teaching in secondary schools, 7% are engineers, and another 7% are technicians.

Preliminary results of another survey show an even higher percentage (85%) of the participants in the Ohio Junior Science and Humanities Symposium program

TABLE 2
Present status of past State Science Day participants

	No. of participants			(%)
	1966	1968	Total	
Graduate school	14	15	29	(16)
Professional school	3	6	9	(5)
Military service	3	7	10	(5+)
Engineers	10	3	13	(7)
Teachers	13	2	15	(8)
Nurses	3	3	6	(3+)
Other professions	4	4	8	(7+)
Technicians	9	4	13	(7)
No information	40	40	80	
Total	99	84	183	

attending college. Add to these figures the 100% of the Armco Scholars graduating from college, and in most cases continuing in graduate school, and you have a rather imposing picture of Junior Academy alumni activities.

In summary, a few conclusions seem to be indicated by the questionnaires returned by cooperating schools.

1. The high school graduate who participates in State Science Day during his senior year is more likely to continue his formal education than is the average high school graduate.

2. High school graduates who participate in State Science Day during their senior year favor Ohio institutions of higher education over out-of-state schools.

3. Students entering Ohio colleges after participating in State Science Day during their senior year prefer to attend one of the colleges serving as a Junior Academy District Center.

4. More than 20 percent of the students who participated in State Science Day as high school seniors continued their education beyond the baccalaureate degree.

Based upon performance over the past 25 years, the Junior Academy seems to have accomplished its assigned mission adequately, though major readjustments may be necessary in order to maintain a viable organization capable of and willing to serve the youth of Ohio in the future.

The most formidable obstacle to effective operation of the Junior Academy for the next five years will be funding. The colleges and universities now serving as district centers are hard-pressed financially and may be forced to withdraw support from certain nonacademic functions, of which the District Science Day may well be one.

It does not seem feasible to attempt within-program funding by increasing present fees or adding new ones. Any meaningful increase would place a burden on the participants and perhaps even jeopardize the recruitment of volunteer help. The logical alternative is to seek financial assistance from external sources. Except for special programs, this method of funding has been avoided in the past; however, it seems to hold the best prospects for the near future.

Consideration should be given to the possibility of consolidating programs with similar programs promoted or sponsored by other groups. Engineering and other professional societies conduct science-oriented programs which overlap or duplicate some Junior Academy activities. Tight money and inflation may adversely affect these programs, and cooperative effort may be required to save the desirable aspects, with mutual benefit for all parties.

Application for small grants should be made to health-related and career-oriented societies. Often money is available to finance small projects falling within the scope of interest of the particular society. Perhaps some organization may be interested in paying the setup fee for State Science Day or some similar project.

The trend toward oral presentation of research projects is assuming considerable attention among senior high school science students. A well-managed program emphasizing this aspect is in order. The program could be entirely new or it could evolve as a time-space expansion of the Junior Academy Sessions.

Science Day programs will continue to be popular with junior high school students, and ample consideration must be given to that level of participation. Perhaps it is time to divide State Science Day into two mutually exclusive events. The possibility of establishing centers at two-year colleges and technical schools should not be overlooked.

The future holds many challenges for precollege science education. Interests will change, and program planning must be timely and well ahead of operations. Increased involvement of science teachers, graduate students, and professional scientists must be forthcoming to facilitate smooth operation of many varied programs.

The Junior Academy is based upon a solid foundation; it has a proud history of accomplishment; it possesses inherent flexibility for adjustment to new requirements; and it will continue to fulfill its mission as mandated by the constitution for many years into the future.

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